



# Quality of life improvement after chest wall masculinization in female-to-male transgender patients: A prospective study using the BREAST-Q and Body Uneasiness Test<sup>☆</sup>

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## KEYWORDS

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**Summary** *Background:* Chest reconstruction in many female-to-male (FTM) transgender individuals is an essential element of treatment for their gender dysphoria. In existing literature, there are very few longitudinal studies utilizing validated survey tools to evaluate patient reported outcomes surrounding this surgery. The purpose of our study is to prospectively evaluate patient reported satisfaction, improvement in body image, and quality of life following FTM chest wall reconstruction.

**Methods:** Our study was a prospective analysis of FTM patients who underwent chest reconstruction by a single surgeon (C.A.) between April 2015 and June 2016. The patients were surveyed preoperatively and 6 months after surgery utilizing the BREAST-Q breast reduction/mastectomy questionnaire and the Body Uneasiness Test (BUT-A). Analysis was performed on their self-reported demographic information, survey results, and chart review data.

**Results:** Of 87 eligible patients, 42 completed all surveys and could be linked to their chart data. From the BREAST-Q surveys, significant improvements were observed in the domains of breast satisfaction, psychosocial well-being, sexual satisfaction, and physical well-being. From the BUT-A surveys, we observed significant improvement in body image, avoidance, compulsive self-monitoring, and depersonalization. Groups with mental health conditions had poorer initial BUT-A scores and greater degree of improvement after surgery.

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**Conclusions:** As the prevalence of gender affirming surgery increases and as health policies are being developed in this area, the need for evidence-based studies surrounding specific interventions is essential. This study demonstrates significant improvement in a number of quality of life measurements in FTM patients after undergoing chest masculinization surgery.

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## Introduction

Transgender individuals feel a discrepancy between their perceived gender identity and the gender assigned to them at birth. Gender dysphoria occurs when these individuals experience significant distress from this condition.<sup>1</sup> Along with counseling, hormones, and other modalities, gender affirming surgery can be an important element for treating gender dysphoria by allowing the individuals to present and interact socially as their perceived gender.<sup>2</sup> The frequency of gender affirming surgery has increased in recent years including, but not limited to, chest wall masculinization, hysterectomy, phalloplasty and/or metoidioplasty for female-to-male (FTM) patients, and breast augmentation, vaginoplasty, and facial contouring for male-to-female (MTF) patients.<sup>3</sup> Not every patient desires surgery and not every surgery is required or indicated for each patient. In FTM patients, chest reconstruction, sometimes referred to as chest wall masculinization or "top surgery," is often the initial surgical procedure performed and sometimes the only surgical procedure performed.<sup>4-9</sup> While cross-sex hormone treatment goes a long way in allowing FTM patients to "pass" in public as their preferred gender, distress over the presence of their breasts contributes to numerous social, physical and psychological problems. Most have to bind their breasts daily in order to conceal them, a process that is uncomfortable, cumbersome, and can lead to rashes, acne, restriction in activity, and even difficulty breathing.

Existing literature has shown that chest wall masculinization offers a number of important benefits to FTM transgender patients including improvement in psychological functioning, reduction in gender dysphoria symptoms, improvement in self-esteem and physical well-being. Pauly and Lindgren first showed that body image was improved in transsexuals after surgical treatment in a cross-sectional analysis of a large population in 1976.<sup>10</sup> Fleming et al. demonstrated increased body satisfaction and increased self-esteem in

FTM patients after a variety of medical and surgical interventions.<sup>11</sup> The most comprehensive demonstration of improvement in psychological functioning after medical and surgical treatment in transgender patients was by De Vries et al. in which 55 patients were followed longitudinally over their entire treatment utilizing the "Dutch approach" which involves a three step sequence of pubertal suppression, cross-sex hormones, and finally gender affirmation surgery.<sup>12</sup> These patients not only experienced improvements in psychological functioning, but also alleviation of gender dysphoria symptoms and overall improvement in well-being. Other studies demonstrated similar findings, but most used a cross-sectional population with multiple variables and were not prospective.<sup>13-16</sup> As health policy evolves in developing standard of care for transgender patients, prospective studies with outcomes data and validated measurements of improved quality of life are needed to convincingly argue for the medical necessity of specific surgeries.

At our institution, female-to-male transgender patients undergo chest wall reconstruction in accordance with the guidelines set out by the World Professional Association for Transgender Health (WPATH) Standards of Care, Version 7.<sup>2</sup> Surgical techniques for chest masculinization include predominantly double incision with free nipple grafting, with less often techniques being periareolar mastectomies, and hybrid techniques with nipple areolar complexes maintained on a pedicle with various patterns of skin excision (Figures 1, 2). Techniques and surgical outcomes in a larger cohort have been described in detail in recent publications.<sup>17,18</sup> The aim of this study was twofold: to evaluate the demographics of patients undergoing FTM chest masculinization, and to prospectively evaluate changes in body image, physical well-being, sexual satisfaction and breast satisfaction following chest masculinization surgery using validated questionnaires. We selected the BREAST-Q survey and the Body Uneasiness Test (BUT-A)<sup>19,20</sup> as together they provide a broad evaluation of body-part specific questions and also address



**Figure 1** Example of patient before and after chest wall masculinization utilizing "double incision" technique with free nipple grafts.



**Figure 2** Example of patient before and after chest wall masculinization utilizing the periareolar technique.

general well-being, body image, and quality of life factors. While these survey tools have not been specifically validated in the transgender population, we felt that they were the best tools currently available to evaluate quality of life improvement after chest surgery.

## Methods

After obtaining approval from the University of Utah Institutional Review Board, we surveyed all FTM transgender patients 18 years of age or older undergoing chest wall reconstruction by a single surgeon (C.A.) between April 2015 and June 2016. The surveys were optional and anonymous and were distributed to patients by email using the REDCap database program.<sup>a</sup> Survey invitations were sent out between one and two weeks preoperatively and again six months postoperatively. The preoperative survey included a demographics questionnaire developed by the Behavioral Risk Factor Surveillance System, which assessed the following categories: age, race, ethnicity, marital status, sexual orientation, education level, and annual income.<sup>21</sup> Both the preoperative and postoperative surveys included questions from the BREAST-Q and the BUT-A survey tools.

The BREAST-Q survey has been utilized in over 50 publications to evaluate patient reported outcomes after breast reduction, breast augmentation, breast conserving therapy, mastectomy, and post-mastectomy reconstruction. It has been used on one occasion for the evaluation of MTF breast augmentation,<sup>22</sup> but to our knowledge has not been used for FTM chest masculinization. We used the BREAST-Q Breast Reduction/Mastopexy Module to measure the following domains: physical well-being, psychosocial well-being, sexual satisfaction, and breast satisfaction. Examples include, "With your breasts in mind, how satisfied or dissatisfied have you been with: How you look in the mirror unclothed," or "With your breasts in mind, in the past 2 weeks, how often have you felt: Confident in a social setting; Confident about your body; Accepting of your body." Postoperative module examples are, "With your breasts in mind, in the past 2 weeks, how satisfied or dissatisfied have you been with: How your scars look; The location of your scars?" and "With your

breasts in mind, in the past 2 weeks, how often have you felt: Good about yourself; Confident in your clothes, Accepting of your body?" The BREAST-Q scores were calculated using the Q-score program, which converts raw survey scores of 1 to 5 to a scale of 0 to 100 with 100 being the most positive result and 0 the most negative.<sup>23</sup>

The Body Uneasiness Test (BUT-A) was developed originally to evaluate body image and other parameters in patients with eating disorders, but has since been used in a number of populations, including a study of cross-sectional differences between transgender patients who used cross-sex hormone treatment and those not taking hormones.<sup>20,24</sup> The BUT-A survey asks a total of 34 questions related to body image and is scored on a six-point Likert scale with zero indicating "never" and 5 indicating "always." Examples of questions include "I like those clothes which hide my body," "I spend a lot of time thinking about some defects in my physical appearance," "I would do anything to change parts of my body," and "I look at myself in the mirror and have a sensation of uneasiness and strangeness." Higher scores indicate greater body uneasiness. The BUT-A scoring produces a total test score, the global severity index, and several subscales including: body image concerns, social avoidance behavior, compulsive self-monitoring, and detachment and/or estrangement feelings toward one's body (depersonalization). The BUT-A survey was created with an additional subscale of weight phobia which we did not choose to include in our study.

A chart review was performed on the patients who responded to both the preoperative and postoperative surveys. Data was collected including body mass index (BMI), history of mental health conditions and other comorbidities, surgical technique, complications, and revision rates.

Statistical analysis was performed for the demographics, the two surveys, and correlation between satisfaction rates and patient demographics, physical factors, and surgical technique. The Q-Score scoring software was used to analyze the BREAST-Q raw data.<sup>23</sup> Means, standard deviations, one way ANOVA tests, t-tests (paired and unpaired), and Pearson correlation tests set at 95% confidence intervals were calculated using SPSS statistical software and Microsoft Excel 2010.

## Results

Out of 87 eligible patients, a total of 43 completed both the preoperative and postoperative surveys, of which 42 were

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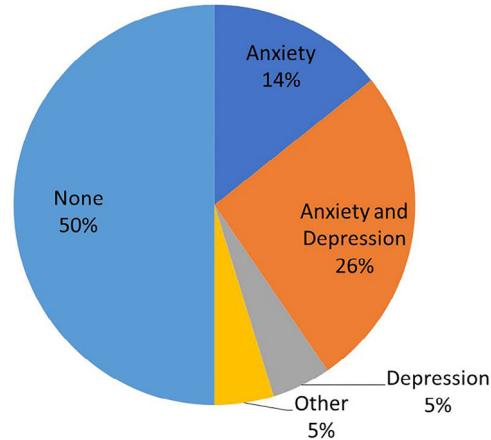
**Table 1** Demographic information of 42 participants.

Age	Ave. 27.7 y (range 18–50)
Race <sup>a</sup>	
White	37 (88%)
African American	1 (2%)
Asian	1 (2%)
Biracial (AA/White)	2 (4%)
Ethnicity	
Hispanic	5 (12%)
Non-Hispanic	37 (88%)
Sexual orientation	
Straight	17 (40%)
Bisexual	4 (10%)
Gay	5 (12%)
Lesbian	1 (2%)
Other <sup>b</sup>	15 (37%)
Highest education level	
Some high school	2 (5%)
Completed high school	5 (12%)
Some college	22 (51%)
Completed college	7 (17%)
Post graduate	6 (14%)
Income level	
0–19k USD	14 (33%)
20–39k USD	14 (33%)
40–59k USD	4 (9%)
60–79k USD	6 (14%)
>80k USD	5 (9%)

<sup>a</sup> N = 41 due to one non-responder.<sup>b</sup> Other included: 4 pansexual, 1 demisexual, 5 queer, 1 not sure, 2 preferred not to answer.

able to be linked to their chart data through the provided email address, for a response rate of 48%. Of the 42 patients in the cohort, the average age was 27.7 years, with a range from 18–50 years. Self-identified race was 88% (37/42) White, 2% (1/42) Asian, 2% (1/42) African American, 4% (2/42) as biracial (African American/White), and one who chose not to answer. When asked about ethnicity, 12% (5/42) identified as Hispanic. Self-identified sexual orientation of the cohort included 40% (17/42) straight, 10% (4/42) bisexual, 12% (5/42) gay, 2% (1/42) lesbian, and 36% (15/42) selected “other,” “not sure,” or “preferred not to answer.” When asked about relationship status, 83% (35/42) reported being single, 10% (4/42) were married, 5% (2/42) were separated or divorced, and 2% (1/42) widowed. Eighty-three percent (35/42) of the patients reported an education level of some college or above. Employment status of patients showed 55% (23/42) to be employed full time while 12% (5/42) were students. Thirty-three percent (14/42) of patients reported an income level of less than \$19,000 annually, 40% (17/42) reported income levels between \$20,000–59,000, and 26% (11/42) reported income of \$60,000 or above (Table 1).

Chart review of the patient group indicated that this was the first transition related surgery for all included patients. All patients had undergone mental health counseling related to their gender dysphoria prior to surgery. Ninety-three percent (39/42) were receiving cross-sex hormone therapy prior to the surgery. Ninety percent (38/42) underwent the double incision technique with free nipple grafts while 10%

**Mental Health Conditions**

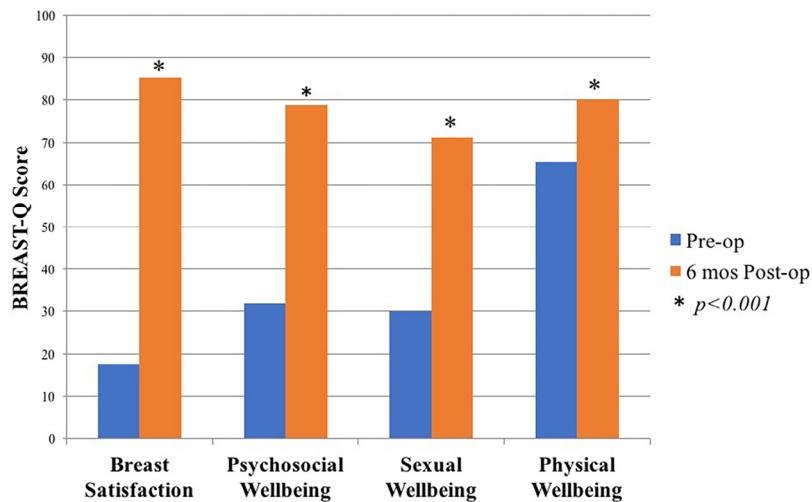
**Figure 3** Half (21/42) of the patients had no preexisting mental diagnoses at the time of their surgery, while the other had diagnoses of either anxiety (5/42), depression (2/42), anxiety and depression (11/42), bipolar (1/42), and one with multiple diagnoses of anxiety, depression, PTSD, and borderline personality disorder.

(4/42) underwent a periareolar technique. The BMI of the included patients averaged 28 with a range from 17–41.

Fifty percent of patients had a psychiatric diagnosis at the time of their surgery (21/42), most commonly anxiety and/or depression; although one patient had bipolar disorder and one listed borderline personality disorder, post-traumatic stress disorder, anxiety, and depression (Figure 3). Thirty-one percent (13/42) of the patients were taking medications for their mental health conditions at the time of the surgery.

On evaluation of postoperative complications in the cohort of 42 patients, revisions were required in only two patients (5%), both of which involved circumareolar skin excision after a periareolar technique. Seroma occurred in 7% (3/42) of patients, all of which were successfully managed with aspiration in the clinic. Hematoma occurred in 5% (4/42) of patients, two of which required washout in the operating room and the other two were small and managed conservatively with warm compresses and existing drains. These rates are comparable to those published in existing literature including a series from our own institution looking at 200 consecutive patients.<sup>18</sup> In this small cohort, we did not find a significant correlation between surgical technique, BMI, or other comorbidities with complication or revision rates.

Comparison of the preoperative and 6-month postoperative BREAST-Q results demonstrated statistically significant improvement in all four measured domains. Breast satisfaction improved from preoperative values averaging  $17.4 \pm 14.0$  and postoperative averages of  $85.0 \pm 11.7$  ( $p < 0.0001$ ). Within this category, postoperatively 93% (39/42) reported being “very satisfied” with how they looked in the mirror clothed as compared with 0% preoperatively ( $p < 0.0001$ ). Psychosocial well-being scores improved significantly from  $31.3 \pm 14.2$  preoperatively to  $78.9 \pm 15.9$  postoperatively ( $p < 0.0001$ ). Within this category, postoperatively 98% (41/42) reported feeling confident in a social setting either “all” or “most of the time” as compared with only 7% (39/42) preoperatively



**Figure 4** BREAST-Q preoperative and six-month postoperative mean scores, with a score of 100 indicating highest satisfaction. Survey results show statistically significant improvement in all four measured domains. \* $p < 0.001$ .

( $p < 0.0001$ ). Sexual satisfaction scores improved from  $30.7 \pm 20.9$  preoperatively to  $71.4 \pm 19.2$  postoperatively ( $p < 0.0001$ ), and physical well-being scores improved from  $65.3 \pm 13.7$  preoperatively to  $80.3 \pm 11.8$  postoperatively ( $p < 0.0001$ ). (Figure 4). There was no statistically significant correlation between post-op BREAST-Q scores (specifically looking at the domain of breast satisfaction) and age, sexual orientation, gender identity, education level, employment status, or income.

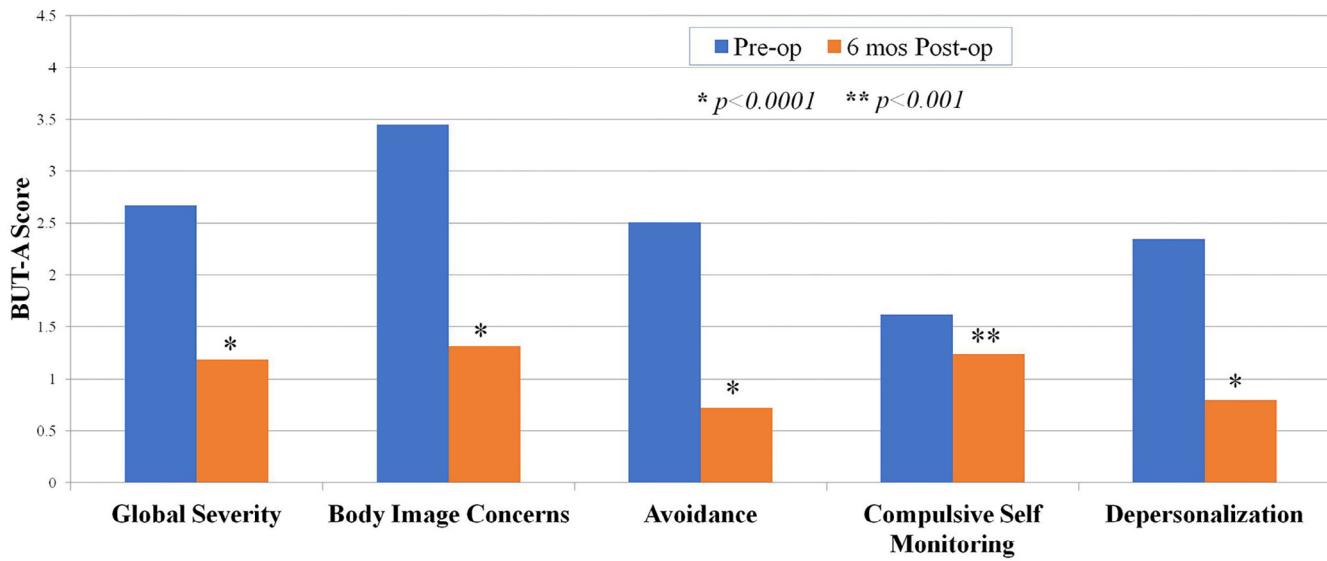
The preoperative and postoperative BUT-A results also showed statistically significant improvement in all of the measured domains. The global severity index (GSI), which is a cumulative measure of all domains, decreased from  $2.68 \pm 0.73$  preoperatively to  $1.20 \pm 0.68$  postoperatively ( $p < 0.0001$ ). Body image concerns decreased from  $3.49 \pm 0.84$  to  $1.33 \pm 0.77$  ( $p < 0.0001$ ). Within this category, postoperatively only 2% (1/42) of the participants answered "always" or "very often" to their experience with the following statement, "I can't stand the idea of living with the appearance I have" as compared to 57% (24/42) of the preoperative group ( $p < 0.0001$ ). Avoidance averages dropped from  $2.51 \pm 1.12$  preoperatively to  $0.74 \pm 0.83$  postoperatively ( $p < 0.0001$ ). Within this category, postoperatively only 2% (1/42) reported answered "always" or "very often" in response to "the thought of some defects of my body torments me so much that it prevents me from being with others," as compared to 43% (18/42) in the preoperative group ( $p < 0.0001$ ). Compulsive self-monitoring decreased from  $1.62 \pm 0.80$  preoperatively to  $1.25 \pm 0.70$  postoperatively ( $p < 0.001$ ), while depersonalization decreased from  $2.35 \pm 0.98$  to  $0.82 \pm 0.74$  ( $p < 0.0001$ ) (Figure 5). It is of interest to note that the 6-month postoperative scores approximated average scores in the non-clinical control group used in the original BUT-A validation study, suggesting near normalization of many body uneasiness concerns after chest surgery.<sup>20</sup> We did not find any statistical correlation between BUT-A GSI scores and age, sexual orientation, gender identity, education level, employment status, or income. We did, however, find a significant difference in BUT-A GSI scores between those patients that did and did not have preexisting mental health conditions. Specifically, those with preexisting mental health

conditions had, on average, poorer body image scores preoperatively (2.9 compared to 2.4,  $p < 0.05$ ) and also had a greater improvement from preoperative to postoperative scores (average decrease in score of 1.7 compared to 1.2,  $p < 0.05$ ) when compared to the patients with no mental health conditions.

## Discussion

Gender affirmation surgery in the form of chest wall masculinization is critical to allow many FTM individuals to present and interact socially as their perceived gender. The results of this prospective study demonstrate statistically significant improvement in a number of quality of life measurements for FTM transgender individuals following chest wall masculinization. These include physical, sexual and psychosocial well-being as determined by the BREAST-Q survey, as well as improvement in body image concerns, decreased avoidance, decreased compulsive self-monitoring, and decreased depersonalization as determined by the BUT-A survey.

The BREAST-Q, while not developed specifically for this patient cohort, is a comprehensive survey tool that examines psychosocial, sexual, and physical well-being. We believe it is the best survey tool currently available to evaluate body-part-specific patient satisfaction after chest wall masculinization. Even with the limitations of language not specifically formulated for the FTM transgender population (for example, "how well does your bra fit"), we were able to demonstrate definitive improvement in body image and quality of life after chest wall reconstruction. The BUT-A survey, while developed originally for patients with eating disorders, addresses body image concerns, which are intimately related to body dysphoria in the transgender patient. The study elucidated dramatic improvement in the body image of the patients and showed significant decrease in avoidance behavior and compulsive self-monitoring. It also demonstrated significant decrease in feelings of detachment and estrangement feelings toward their bodies following chest reconstruction. These findings are particularly meaningful



**Figure 5** Body Uneasiness Test-A preoperative and six-month postoperative mean scores, with a score of five indicating high uneasiness and zero indicating low uneasiness. Survey results show statistically significant improvement in all five measured domains. \* $p < 0.0001$ , \*\* $p < 0.001$ .

as they may correspond to a decrease in self-harm and suicide attempts, which are known to be prevalent in the transgender population.<sup>25</sup> In the future, it will be important to establish transgender specific surveys with broadened metrics to include evaluation of gender congruence and symptoms of dysphoria, and can be used across a broader range of interventions targeting gender dysphoria.<sup>26</sup>

The finding of significantly poorer BUT-A global severity scores in the preoperative group of patients that had mental health conditions is not surprising, although it is not clear whether the anxiety and other conditions are the cause of the poorer satisfaction or the other way around. The fact that the degree of improvement in body uneasiness was significantly greater in those with underlying mental health conditions is particularly interesting and not as intuitive. While one might expect that conditions such as anxiety and depression would lead to a poorer perception in outcomes, we found the reverse to be true. This finding argues specifically for the benefit of this surgery in patients with a history of mental health conditions.

Our results support a growing body of literature that demonstrates high satisfaction, low rate of regret, and improvement in a number of quality of life measurements in FTM patients undergoing chest wall masculinization. De Cuypere et al., in a 2004 follow-up study of gender affirmation surgeries, surveyed patients one year or more after surgery. Of the 14 FTM patients who underwent mastectomy ( $n=14$ ), 35.7% were very satisfied, 42.8% were satisfied, and 21.4% were neutral. No one reported being unsatisfied.<sup>27</sup> This is a similar finding with the 2007 review by Nelson et al. which surveyed 12 patients after surgery and found that there were no cases of regret, 10 highly recommended surgery, and one recommended surgery.<sup>28</sup> Fleming et al., in a 1982 study, found a tendency toward increased body satisfaction with increased amount of gender affirmation surgery when looking at the body image of the postoperative female-to-male transgender patient.<sup>11</sup> Gijs and Brewaeys, in a review of a range of gender affirmation surgeries,

found that after one year or more, 771 of 807 patients (96%) were satisfied with the outcome surgery.<sup>29</sup> Most recently, van de Grift et al. demonstrated improvement in situational body dysphoria and body satisfaction in FTM patients after chest surgery. Interestingly, they did not find change in self-esteem and body image-related quality of life, although participants stated a positive or very positive effect of the mastectomy on daily life, quality of life, social situations, self-esteem and body image.<sup>16</sup> Our results add to the body of literature demonstrating the clear improvement in a number of domains following chest surgery, although it is important to note that nearly all of the studies utilized different survey tools to reach their conclusions.

Our study is limited by cohort size, the relative lack of diversity in the respondents (most were White), and the possibility of selection bias in those that were motivated to respond to the surveys. Additionally, the study does not take into account the timing and effect of testosterone therapy, or other interventions for treating gender dysphoria. While the majority (93%) of patients had already started on cross-sex hormones prior to surgery, we did not take into account how long they had been on therapy or whether any patients started hormone therapy during the postoperative period. The response rate was low at <50%, which we attribute in part to a period of time in the middle of the study during which the automated REDCap survey system failed to send the survey requests. While the data we were able to collect was still highly significant, in future it will be important to improve this rate with an improved survey system, increased reminders, or incentives. It is also appreciated that the 6-month follow-up period may not reflect long-term attitudes about the surgery. As stated by De Cuypere et al., the year following surgery is often called the "honeymoon period", and it will be interesting to see if outcomes differ after more time has passed.<sup>27</sup> Additionally, better analysis of the effects of this surgery and others could be accomplished by standardization of evaluation metrics

and development of more transgender specific measurement tools.

## Conclusions

Our study demonstrates dramatic improvement in quality of life for FTM transgender individuals undergoing chest wall masculinization using the most applicable currently available survey tools. Our patient reported outcomes results show positive, statistically significant changes in several different domains including physical, psychosocial, sexual well-being, and self-esteem. As health care policies continue to evolve, proof of positive effect is increasingly important for determination of insurance coverage, and this information contributes valuable insight into the effect of this specific surgery. To critically evaluate the medical necessity of individual gender affirming procedures, it will be important to establish universally accepted metrics and to track outcomes in a prospective manner before and after specific surgical interventions.

## Conflict of interest

The authors declare that they have no conflict of interest.

## Ethical approval

All research was performed in accordance with the ethical standards of the University of Utah Institutional Review Board.

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